

BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

COMPLETED
ORIGINAL

U.S. Nuclear Non-Proliferation Policy: Impact On Exports And Nuclear Industry Could Not Be Determined

The Nuclear Non-Proliferation Act of 1978 established new measures to prevent the diversion to weapons use of peaceful nuclear exports. It also created a policy to confirm U.S. reliability as a nuclear supplier.

GAO did not identify any export sales lost as a result of the Act, but did find indications that nonproliferation policies can influence export sales. Based on available data, GAO could not determine the impact of the Act on the competitiveness of U.S. nuclear exports. However, U.S. companies are at some disadvantage because importers perceive that implementation of the Act may result in delayed export licenses.

The United States dominated the nuclear export market through the early 1970s. However, foreign competitors, some aided by U.S. technology transfers, emerged to monopolize home markets and compete for third-country business. Further, the market has been depressed since 1974 and prospects for U.S. nuclear power plant exports have dimmed greatly. However, U.S. companies continue to view exports as important to sustain production capacity.



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ABBREVIATIONS

AECL	Atomic Energy of Canada, Limited
EIA	U.S. Energy Information Administration
GAO	General Accounting Office
GE	General Electric Company
IAEA	International Atomic Energy Agency
MWe	Megawatts electricity
NNPA	Nuclear Non-Proliferation Act of 1978

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

U.S. NUCLEAR NON-PROLIFERATION
POLICY: IMPACT ON EXPORTS AND
NUCLEAR INDUSTRY COULD NOT
BE DETERMINED

D I G E S T

This report provides a perspective on U.S. participation in a changing world nuclear market, the effect of nonproliferation policies in that market, and some of the related economic implications.

GAO could not determine the impact of the Nuclear Non-Proliferation Act on the competitiveness of U.S. nuclear exports. The Act had no apparent influence on the award of five nuclear reactor orders to foreign suppliers in the 2 years after its March 1978 passage and did not prevent the sale of four reactors by a U.S. supplier. However, there were indications that nonproliferation policies can influence export sales. Industry officials and foreign customers have complained about the Act's export restrictions and resulting licensing delays but provided little evidence that it actually caused lost export sales. GAO did find that U.S. nonproliferation policies preceding the Act did play a part in the failure of U.S. suppliers to win orders in Brazil and Iran during 1975-77.

DECLINE OF U.S. DOMINANCE
OVER NUCLEAR EXPORTS

U.S. companies dominated the nuclear export market through the early 1970s, gaining 86 percent of free-world nuclear power reactor exports during 1970-73. The United States also monopolized the supply of uranium enrichment services for free-world reactors. However, many foreign reactor vendors have emerged--some aided by U.S. technology sales--to capture their domestic markets, thus shrinking the market available to U.S. companies. Several foreign vendors have also competed aggressively for export sales,

reducing the U.S. share of free-world reactor exports to less than 50 percent for 1974-79. In addition, European and Soviet suppliers are competing for sales of uranium enrichment services.

In the highly competitive nuclear export market, technology, economics, and politics may influence a customer's choice of suppliers. Divergence in nuclear nonproliferation policies is but one of the many factors.

THE NON-PROLIFERATION ACT:
AN UNCERTAIN IMPACT ON
NUCLEAR EXPORTS

GAO found little evidence that the Nuclear Non-Proliferation Act actually caused lost export sales. However, nuclear industry officials and foreign customers have complained about the Act's export restrictions and resulting export license delays. In addition, U.S. nonproliferation policies preceding the Act played a part in the failure of U.S. companies to win reactor orders in Brazil and Iran during 1975-77. GAO concluded that the impact of the Act on the competitiveness of nuclear exports could not be determined.

There were international sales of only 9 nuclear power reactors in the 2 years after passage of the Act. Romania ordered four reactors from Atomic Energy of Canada, Ltd., and Argentina ordered one reactor from Kraftwerk Union of West Germany. All five are to be natural-uranium-fueled, heavy-water reactors. U.S. companies do not produce this type of reactor and did not compete for these orders.

In the same period, a U.S. company was successful in selling four power reactors to South Korea. The customer's concerns over U.S. nonproliferation policies were overcome by contract clauses that permit cancellation in the event export licenses are not issued

timely and by introduction of a congressional resolution that would permit a variance to the existing uranium enrichment ceiling.

In the 3 years--1975 through 1977--preceding the Act, Kraftwerk Union and Framatome (France) won export orders for a total of 10 nuclear power reactors in four countries--Spain, South Africa, Iran, and Brazil. U.S. companies won orders for seven reactors in Spain and one reactor in the Philippines. During that period, U.S. nonproliferation policies were evolving and included certain provisions--restrictions on enrichment technology exports and control over reprocessing of U.S.-origin fuel--that became law in the Act. The evidence as to whether evolving U.S. nonproliferation policies hurt the ability of U.S. companies to compete for reactor export orders was mixed. Nonproliferation policies had no decisive impact on the awards to foreign vendors in the cases of Spain and South Africa. U.S. policies did, however, play a part in the failure of U.S. firms to market plants in Brazil and Iran.

Spanish electric utilities placed orders for nuclear plants with Kraftwerk Union in 1975 and 1977. Superior financing terms offered by the Germans were the decisive factor in these sales. U.S. companies argue strongly that U.S. nonproliferation policies have eroded their market position and will have an impact on future U.S. business opportunities in Spain.

South Africa awarded contracts for 2 nuclear units to Framatome in 1976. General Electric had initially been designated the successful bidder but found itself forced to withdraw following the breakup of its consortium arrangement with a European firm. By that time, concern had surfaced as to whether any U.S. nuclear vendor could obtain either U.S. Export-Import Bank financing guarantees or an export license in light of the political and human rights controversies between the United States and South Africa.

Iran ordered a total of six reactors from Kraftwerk Union and Framatome during 1975-77. These purchases were negotiated with each supplier individually in accordance with a national nuclear plan that allocated shares in the Iran market to German, French, and U.S. suppliers. U.S. companies could not obtain sales commitments from Iran during this period because of delays in concluding a U.S.-Iran agreement for cooperation on nuclear matters. A major factor that delayed the agreement was Iran's opposition to a U.S. demand for veto rights on the transfer of spent fuel for reprocessing, a key U.S. nonproliferation policy. The German and French reactors, however, are not likely to be completed. The new government has announced its intent to terminate the nuclear program.

Brazil reached agreement with Germany in 1975 to purchase at least two nuclear power plants as well as enrichment and reprocessing technology. The U.S. Government's 1974 declaration that future enrichment service contracts were contingent upon availability of U.S. enrichment capacity, as well as its policy severely restricting export of enrichment technology, strongly influenced Brazil to seek the agreement with Germany. Brazil's uneasiness over the reliability of the United States as an enrichment supplier, coupled with an interest in building a nuclear industry and acquiring energy independence, were decisive factors in this purchase.

U.S. PROSPECTS IN A DECLINING NUCLEAR EXPORT MARKET

Forecasts of future world nuclear power plant capacity have indicated progressively lower growth rates since 1973. A May 1979 Energy Information Administration report estimated that 1985 world capacity, excluding Communist areas, would amount to only 40 percent of the capacity forecast in 1973 and estimates for later years declined even more. By deleting

data for plants operating or under construction and deleting data for the United States, GAO estimated that the remaining export market consists of

--37,000 to 78,000 MWe capacity by 1990 and
--104,000 to 167,000 MWe capacity by 1995.

Prospects for U.S. nuclear power exports have also suffered, because foreign suppliers have captured their home markets and compete vigorously for the remaining exports and customers are likely to demand increasing local participation in projects. GAO's analysis of reports by the Energy Information Administration indicates that export projects to be completed by 1995 which are open to U.S. competition will be in the range of 26,000 to 53,000 MWe. This is a radical decline from an April 1976 Government estimate that U.S. exports to countries not producing nuclear power plants would amount to 150,000 MWe capacity between 1980-90.

U.S. companies continue to view exports as very important despite the diminished prospects. Westinghouse estimated that a 900 MWe nuclear power plant may be priced at more than \$1 billion and generate more than 17,000 man-years of employment for the seller and its suppliers.

The present status of nuclear energy programs has led some to question the viability of the nuclear industry worldwide. One study suggested that, unless substantial political and economical changes occur in the early 1980s to stimulate new orders, several major nuclear suppliers--both U.S. and foreign--will be severely strained to maintain reactor manufacturing operations.

AGENCY COMMENTS

The State Department agreed with GAO's basic conclusion that the impact of the Nuclear Non-Proliferation Act on the competitiveness of nuclear exports could not be specifically determined. However, the Department did not wish to imply that nuclear nonproliferation policies have no impact on nuclear exports.

The Department of Energy and the Export-Import Bank of the United States did not disagree with any of GAO's conclusions. Energy provided updated information relevant to the export market, and the Bank suggested alternate analysis methodology that might be useful to a study of this nature.

The Department of Commerce agreed that GAO's basic conclusion may be technically accurate but, nevertheless, misleading. Commerce asserted that some major export sales were lost primarily because of U.S. nuclear nonproliferation policies that prevented U.S. companies from competing for those sales. However, that assertion relies on the tenuous assumption that U.S. companies would have won those sales if they had competed. Since U.S. companies could not compete for those sales, GAO believes that the impact of the policies could not be determined.